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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MASAYOSHI SAWAI

Appeal 2009-005538[1]
Application 10/669,644
Technology Center 2100

Decided: January 19, 2010

Before LEE E. BARRETT, JEAN R. HOMERE, and JAMES R. HUGHES, *Administrative Patent Judges*.

HOMERE, *Administrative Patent Judge*.

DECISION ON APPEAL

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[1] Filed September 25, 2003. The real party in interest is Yazaki Corporation. Appellant presented oral arguments on this case in a hearing held on January 14, 2010.

I. STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134(a) (2002) from the Examiner's final rejection of claims 1 through 8. (App. Br. 4.) We have jurisdiction under 35 U.S.C. § 6(b) (2008).

We affirm.

Appellant's Invention

Appellant invented a method and apparatus for designing an optimal wiring structure for use in a vehicle such that wire harness associated therewith can withstand a specified vibration. (Spec. 1, ll. 8-13.) As shown in Figures 1 and 3B of Appellant's Drawings, the wiring structure includes a plurality of elastic line streak members, each having a circular section (A) and a plurality of beam elements (c1, c2, cn) linearly coupled to each other. (Spec. 9, ll. 13-23, and 13, ll. 2-10.) In order to achieve the optimal design for the wiring structure, the invention utilizes characteristics of each beam element, such as length, sectional area, elasticity, inertia, density of the beam to calculate the predicted shape of the wiring structure, as well as the natural frequency that can withstand the specified vibration. (Spec. 13, 12-23, and 30, ll. 10-25.)

Illustrative Claim

Independent claim 1 further illustrates the invention. It reads as follows:

> 1. A method of assisting a wiring design of a wiring structure comprising the steps of:
>
> regarding the wiring structure constituted by a plurality of pieces of line streak members as an elastic body having a circular section, the elastic body having a plurality of beam elements coupled with each other, a linearity of the plurality of beam elements being maintained;

applying information concerning a shape characteristic, a material characteristic and a constraining condition of the wiring structure as a predetermined condition to a finite element method;

calculating a predicted shape of a displaced wiring structure such that the predetermined condition is satisfied;

further calculating a characteristic value with respect to vibration for the calculated predicted shape; and

outputting the calculated predicted shape and the calculated characteristic value.

Prior Art Relied Upon

The Examiner relies on the following prior art as evidence of unpatentability:

Kodama 9,961,683 B2 Nov. 1, 2005

R. Neul, et al., *A Modeling Approach to Include Mechanical Microsystem Components into the System Simulation*, 1998 Proceedings of Design, Automation and Test in Europe 510 (hereinafter "Neul").

S. T. Peterson et al., *Application of Dynamic System Identification to Timber Beams*, 2001 J. Structural Engineering 418 (hereinafter "Peterson").

Rejection on Appeal

The Examiner rejects the claims on appeal as follows:

Claims 1 through 8 stand rejected as being unpatentable under 35 U.S.C. § 103(a) over the combination of Kodama, Neul and Peterson.

Appellant's Contentions

Appellant contends that Kodama, Neul and Peterson are not properly combined, and that the proffered combination does not teach or suggest (1) maintaining linearity between a plurality of beam elements, (2) calculating

the predicted shape of the beam using information pertaining to the shape characteristic, material characteristic and constraining condition and (3) calculating a characteristic value with respect to vibration for the predicted shape, as recited in independent claim 1. (App. Br. 11-14.) According to Appellant, Neul's disclosure of a modeling approach that uses linear systems cannot be properly combined with Kodama's disclosure of calculating the flexural rigidity of a wire harness to produce a plurality of beam elements between which linearity is maintained. (*Id.*, Reply Br. 4-5.)

Examiner's Findings

The Examiner finds that the combined teachings of Neul and Kodama assume a linear relationship between a plurality of beam elements coupled to one another. (Ans. 10.) Further, the Examiner concludes:

> Because Kodama teaches inputting shape characteristics and constraining conditions into a process to calculate the shape of a wiring structure, and since Neul and Peterson are both directed to modeling a mechanical structure with beam elements wherein material characteristics determine the properties of the beam elements, the Examiner concludes that the combinations of the teachings of Kodama, Neul and Peterson teach or suggest that predetermined characteristics of shape characteristics, material characteristics, and constraining conditions must be satisfied in calculating the shape of a wiring structure, wherein the wiring structure is modeled as a plurality of beam elements.

(*Id.* at 11.)

II. ISSUE

Has Appellant shown that the Examiner erred in finding that Kodama, Neul, and Peterson are properly combined to teach or suggest (1) maintaining linearity between a plurality of beam elements, (2) calculating

the predicted shape of the beam using information pertaining to the shape characteristic, material characteristic and a constraining condition and (3) calculating a characteristic value with respect to vibration for the predicted shape of the beam, as recited in independent claim 1?

III. FINDINGS OF FACT

The following Findings of Fact (FF) are shown by a preponderance of the evidence.

Kodama

1. Kodama discloses a method and system for designing a wiring structure by calculating the flexural rigidity and the shape of a target wire harness having a plurality of branches. (Abst., Figs. 1 and 8.)

2. As shown in Figure 5, for each wire branch, Kodama discloses a beam element of the wire structure having circular section and an elastic body. (Col. 7, ll. 24-33.) Upon an operator entering beam element characteristics such as curvature, thickness, tangential direction, and length of the wire harness, the disclosed system calculates the flexural rigidity (E) and the shape of the wire harness. (Col. 8, ll. 15-60, col. 10, ll. 25-58.)

Neul

3. Neul discloses a beam modeling approach wherein a mechanical structure is split into finite beam elements, and a linear system is used to couple the beam elements to one another. (P. 511, Fig. 2 and p. 514, last para. - p. 515, 1st para.) The disclosed approach calculates the behavior of each beam element using characteristics such as density, and elasticity. (P. 512, 2nd para.)

4. Neul discloses calculating natural frequencies with reference to a desired vibration for each beam element. (P. 515, 2nd para.)

Peterson

5. Peterson discloses a finite element model for dynamically identifying timber beams. (Abst.) In particular, Peterson discloses evaluating the frequency response function (FRF) for each measurement point to obtain the natural frequencies of vibration and the corresponding mode shapes thereof to subsequently calculate the experimental and reconstructed mode shape associated therewith. (P. 419, 422.)

IV. PRINCIPLES OF LAW

Obviousness

"On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness." *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998).

> Section 103 forbids issuance of a patent when "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains."

KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 406 (2007).

In *KSR*, the Supreme Court emphasized "the need for caution in granting a patent based on the combination of elements found in the prior art," and discussed circumstances in which a patent might be determined to be obvious. *Id.* at 415 (citation omitted). The Court reaffirmed principles based on its precedent that "[t]he combination of familiar elements

according to known methods is likely to be obvious when it does no more than yield predictable results." *Id.* at 416. The operative question in this "functional approach" is thus "whether the improvement is more than the predictable use of prior art elements according to their established functions." *Id.* at 415, 417.

In identifying a reason that would have prompted a person of ordinary skill in the relevant field to combine the prior art teachings, the Examiner must show "'some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.'" *Id.* at 418 (*quoting In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

V. CLAIM GROUPING

Appellant argues the patentability of the claims on appeal as a group by arguing the rejection of claim 1. In accordance with 37 C.F.R. § 41.37(c)(1)(vii), we will consider the claims on appeal as standing and falling with representative claim 1.

VI. ANALYSIS

Independent claim 1 requires, in relevant part, (1) maintaining linearity between a plurality of beam elements, (2) calculating the predicted shape of the beam using information pertaining to the shape characteristic, material characteristic and a constraining condition and (3) calculating a characteristic value with respect to vibration for the predicted shape of the beam.

As set forth in the Findings of Facts section, Kodama discloses a system for designing a wire harness including a beam element having a

circular section and an elastic body. (FF. 2.) Kodama further discloses using the curvature, length, and thickness of the beam to thereby calculate the shape and the flexural rigidity therefor. (FF. 1-2.) Next, Neul discloses a modeling structure that splits a mechanical structure into finite beam elements that are subsequently added to one another in a linear system. (FF. 3.) Neul also discloses using the density and elasticity of each beam element to calculate its behavior, as well as its frequency with respect to vibration. (FF. 3-4.) Additionally, Peterson discloses a modeling approach that uses the natural frequencies of vibration for timber beams to thereby calculate the expected shape of the beam structure. (FF. 5.)

We agree with the Examiner's finding that the proffered combination teaches the disputed limitations. In particular, we find that Neul's disclosure teaches or suggests using a linear system to couple beam elements that were split from a mechanical structure. We thus find that one of ordinary skill in the art would have readily appreciated that the combination of Neul and Kodama would have predictably resulted in a designing wire harness by coupling a plurality of beam elements of the wire in a linear fashion. Similarly, we find that Neul's disclosure of using the density and elasticity characteristics of a beam element, taken in combination with Kodama's disclosure of using the thickness, curvature and length of the beam, would predictably result in using the cited beam characteristics to calculate the predicted shape of the wiring structure. Further, we find that Peterson's disclosure of calculating the expected shape of the beam reinforces the disclosures of the Kodama-Neul combination as it pertains to calculating the predicted shape of the wire harness. Additionally, we find that Peterson's system of using natural frequencies of vibration for each beam element

reinforces Kodama-Neul combination as it pertains to using the beam characteristics to determine its frequency with respect to vibration. We consequently find that the ordinarily skilled artisan would have readily recognized that the combination of Kodama, Neul and Peterson discloses known elements that perform their ordinary functions to predictably result in a modeling system that couples beam elements to one another in a linear fashion, and further uses the characteristics of the coupled beam elements to determine the shape of a wiring structure, as well as the natural frequency that corresponds to a desired vibration. *See KSR*, 550 U.S. at 418-419. Therefore, Appellant's argument that there is insufficient rationale to combine the references is not persuasive.

It follows that Appellant has not shown that the Examiner erred in concluding that the combination of Kodama, Neul and Peterson renders claim 1 unpatentable. As claims 2-8 were argued based on the argument set forth with respect to claim 1, we find that the Appellant has not shown the Examiner erred in concluding that the combination of Kodama, Neul and Peterson renders claims 2-8 unpatentable.

VII. CONCLUSION OF LAW

Appellant has not established that the Examiner erred in rejecting claims 1 through 8 as being unpatentable under 35 U.S.C. § 103(a).

VIII. DECISION

We affirm the Examiner's rejection of claims 1 through 8.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

nhl

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